Part No. 302702-B Rev 00
January 2000

4401 Great America Parkway
Santa Clara, CA 95054

E1/FE1 Adapter Module
Supplement

NORTEL NETWORKS™

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Preface

The E1/FE1 Adapter Module provides high speed connectivity to E1 digital data services. It operates at fractional rates up to full E1 speed, and supports both the G.703 and G.704 standards.

Before You Begin

This guide is intended for qualified service personnel who are installing the E1/FE1 Adapter Module in an AN/ANH, ARN, Passport 5430, or Passport 2430 for the first time or who need to install or replace any customer-replaceable unit (CRU). A qualified service person should have appropriate technical training and experience and be aware of the hazards involved in installing and replacing CRUs.

How to Use This Supplement

This WAN adapter module can be used with several different platforms. Refer to the table below to find the chapter that contains the information appropriate for the platform you are using.

Platform	**Refer to**
AN or ANH	Chapter 1
ARN	Chapter 2
Passport 5430	Chapter 3
Passport 2430	Chapter 4

Text Conventions

This guide uses the following text conventions:

bold text	Indicates command names and options and text that you need to enter. Example: Enter the **diags** command.
italic text	Indicates new terms, book titles, and variables in command syntax descriptions.

Acronyms

This guide uses the following acronyms:

CRU	customer-replaceable unit
ESD	electrostatic discharge
FE1	fractional E1
PROM	programmable read-only memory
WAN	wide area network

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Billerica, MA	800-2LANWAN (800-252-6926)
Santa Clara, CA	800-2LANWAN (800-252-6926)
Valbonne, France	33-4-92-96-69-68
Sydney, Australia	61-2-9927-8800
Tokyo, Japan	81-3-5740-1700

Chapter 1
Using the E1/FE1 WAN Adapter Module in a BayStack AN or ANH Router

This chapter supplements *Installing a WAN Adapter Module in a BayStack AN or ANH Router.* Follow the hardware installation steps in that manual, then refer to this document for information specific to the E1/FE1 WAN adapter module.

Warning: The E1/FE1 WAN adapter module is designed to operate only in AN, ANH, ARN BayStack routers and the Passport 5430 and Passport 2430. Attempting to use the E1/FE1 WAN adapter module in any other product may be hazardous and invalidates the regulatory approval.

Verifying AN/ANH Router Requirements

Table 1-1 shows the version and location of programmable read-only memory (PROM) boot and diagnostic code required for the E1/FE1 WAN adapter module.

Table 1-1. PROM Diagnostic and Boot Code for AN/ANH Routers

Code Type	Version	Directory	File Name
Boot	9.00c	*an_proms*	*anboot.exe*
Diagnostic	7.32	*an_proms*	*andiag.exe*

For information about upgrading PROM code, see the *BayRS™ Upgrading Routers* guide.

Attaching Cables

Connect the communications cable to the RJ-48C connector on the installed adapter module.

You install the E1/FE1 adapter module in an open adapter module slot on the router as follows:

- AN or 12-port ANH -- the back-panel WAN module slot 3 (Figure 1-1).
- 8-port ANH -- the back-panel COM3 slot (Figure 1-2).

  See *Installing a WAN Adapter Module in a BayStack AN or ANH Router* for complete installation instructions.

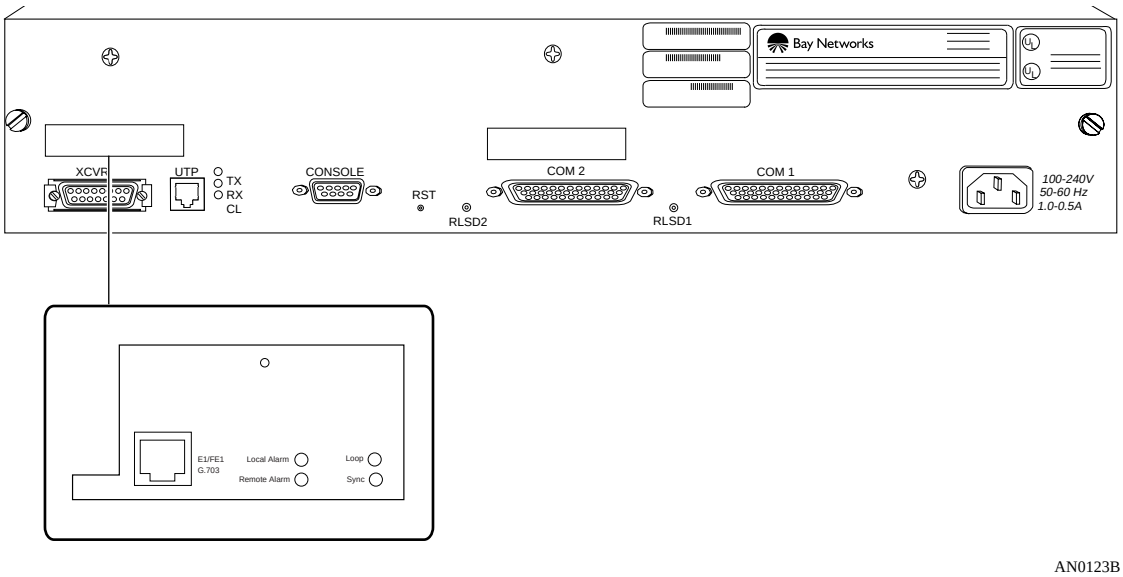


Figure 1-1. E1/FE1 WAN Adapter Module Connector on an AN or 12-Port ANH

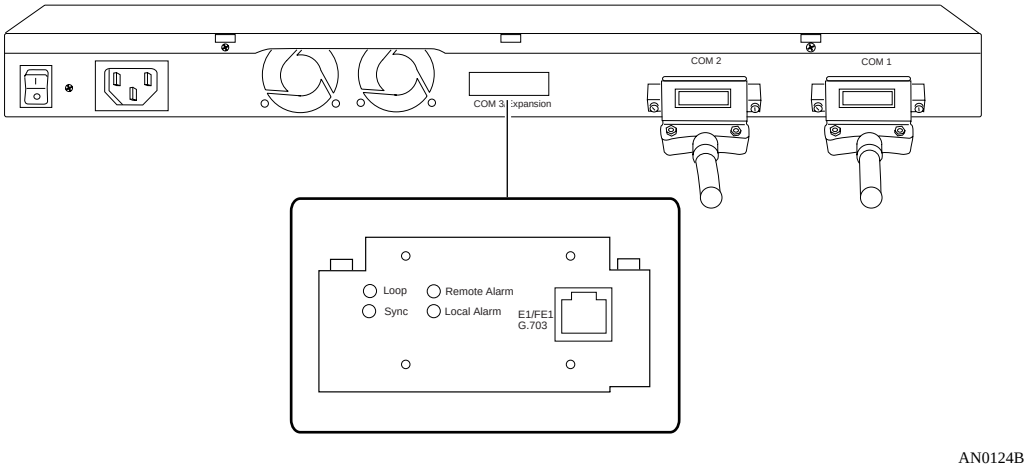


Figure 1-2. E1/FE1 WAN Adapter Module Connector on an 8-Port ANH

Connect the E1/FE1 cable to the connector on the installed adapter module (Figure 1-3).

Note: The E1/FE1 input port shall operate with an interconnecting cable loss within the range of 0 to 6 decibels (dB), measured at 1024 kilohertz (kHz).

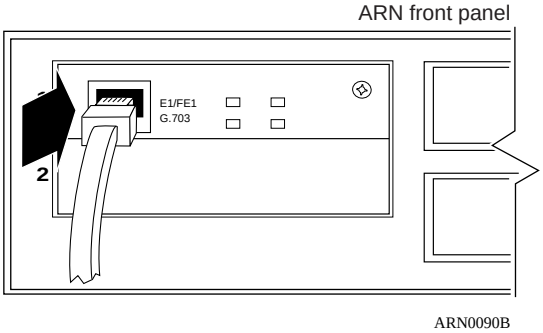


Figure 1-3. Cable Connection for the E1/FE1 WAN Adapter Module

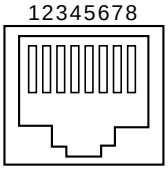
E1/FE1 Connections

The BayStack routers support the conversion of data (HDLC protocol) from an E1 line using an optional E1/FE1 adapter module. The integrated DSU/CSU functionality allows direct connection to the E1 network, as opposed to connecting via an external adapter. This solution reduces equipment costs and simplifies connection to an E1 carrier.

The E1/FE1 implementation supports dynamic reconfiguration, Fractional E1 loopback, and an integrated Bit Error Rate Test (BERT) line tester. *Configuring WAN Line Services* describes these services and how to configure them for connection to an E1 network.

Table 1-2 lists the E1/FE1 connector pinouts.

Table 1-2. RJ-48C Connector Pinouts

Pin Assignment	Pin No.	Signal
	1	Receive Data TIP
	2	Receive Data RING
	3	Chassis Ground
	4	Send Data TIP
	5	Send Data RING
	6	Chassis Ground
	7	No Connect
	8	No Connect

Interpreting LEDs

The E1/FE1 WAN adapter module has four LEDs (Figure 1-4).

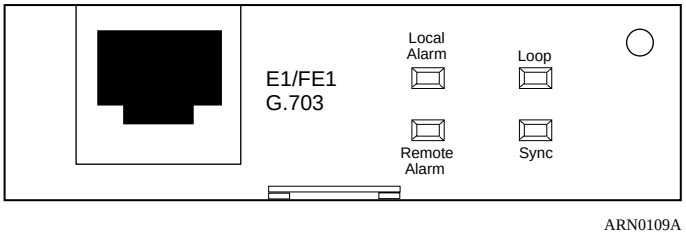


Figure 1-4. E1/FE1 WAN Adapter Module LEDs

Table 1-3 describes the function of each E1/FE1 LED.

Table 1-3. E1/FE1 WAN Adapter Module LEDs

Label	Color	Meaning
Local Alarm	Amber	Lights when the E1 port is in a local alarm state.
Remote Alarm	Amber	Lights when the E1 port has received a remote alarm from the E1 network.
Loop	Amber	Lights when the E1 interface is placed in loopback mode.
Sync	Green	Lights when the E1 port is synchronized with the E1 network.

Completing Software Configuration

Once you have successfully installed the adatper module, complete the following software configuration tasks using instructions found in your BayRS documentation:

Configuration Task	Location of Instructions
Connect the AN or ANH to the network.	• Installing and Operating BayStack AN and ANH Routers
Modify the configuration file to add the E1/FE1 module and enable default E1/FE1 software services.	One of the following: • *Configuring and Managing Routers with Site Manager* • *Using the Bay Command Console (BCC)*
Configure E1/FE1 services.	One of the following: • Configuring WAN Line Services • Configuring BayStack Remote Acces

For the latest information, be sure to review the release notes and documentation change notice for your version of BayRS software.

Note: The only boot/startup methods you can use from the E1/FE1 WAN adapter module interface are Local Boot and EZ-Install. The E1/FE1 WAN adapter module does not support Netboot or Directed Netboot.

Note: Adding software for the WAN adapter module may increase the router's memory requirements beyond its current capacity. If the BayStack router experiences a memory problem, see the section "Memory or Buffer Problem" in *Troubleshooting Routers*. For information about changing the router image, see *Configuring and Managing Routers with Site Manager.*

Chapter 2
Using the E1/FE1 WAN Adapter Module in a BayStack ARN Router

This chapter supplements *Installing and Operating BayStack ARN Routers* (Chapter 4, “Installing a WAN Adapter Module.”). Follow the hardware installation steps in that manual, then refer to this document for information specific to the E1/FE1 WAN adapter module.

Warning: The E1/FE1 WAN adapter module is designed to operate only in AN, ANH, and ARN BayStack routers and the Passport 5430 and Passport 2430. Attempting to use the E1/FE1 WAN adapter module in any other product may be hazardous and invalidates the regulatory approval.

Verifying ARN Router Requirements

Table 2-1 shows the version and location of programmable read-only memory (PROM) boot and diagnostic code required for the E1/FE1 WAN adapter module.

Table 2-1. PROM Diagnostic and Boot Code for ARN Routers

Code Type	Version	Directory	File Name
Boot	1.20	*arn_proms*	*arnboot.exe*
Diagnostic	2.06	*arn_proms*	*arndiag.exe*

For information about upgrading PROM code, see the *BayRS™ Upgrading Routers* guide.

Attaching Cables

Connect the communications cable to the RJ-48C connector on the installed adapter module.

You install the E1/FE1 adapter module in one of the two front-panel WAN adapter module slots (Figure 2-1). See *Installing and Operating BayStack ARN Routers* for complete installation instructions.

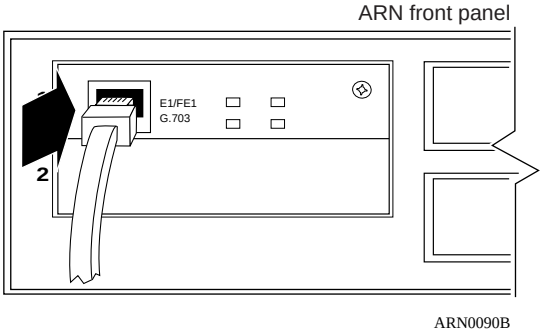


Figure 2-1. E1/FE1 WAN Adapter Module Connector on an ARN

Connect the E1/FE1 cable to the connector on the installed adapter module (Figure 2-1).

Note: The E1/FE1 input port shall operate with an interconnecting cable loss within the range of 0 to 6 decibels (dB), measured at 1024 kilohertz (kHz).

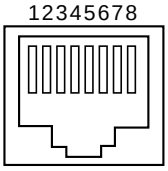
E1/FE1 Connections

The BayStack ARN supports the conversion of data (HDLC protocol) from an E1 line using an optional E1/FE1 adapter module. The integrated DSU/CSU functionality allows direct connection to the E1 network, as opposed to connecting via an external adapter. This solution reduces equipment costs and simplifies connection to an E1 carrier.

The E1/FE1 implementation supports dynamic reconfiguration, Fractional E1 loopback, and an integrated Bit Error Rate Test (BERT) line tester. *Configuring WAN Line Services* describes these services and how to configure them for connection to an E1 network.

Table 2-2 lists the E1/FE1 connector pinouts.

Table 2-2. RJ-48C Connector Pinouts

Pin Assignment	Pin No.	Signal
	1	Receive Data TIP
	2	Receive Data RING
	3	Chassis Ground
	4	Send Data TIP
	5	Send Data RING
	6	Chassis Ground
	7	No Connect
	8	No Connect

Interpreting LEDs

The E1/FE1 WAN adapter module has four LEDs (Figure 2-2).

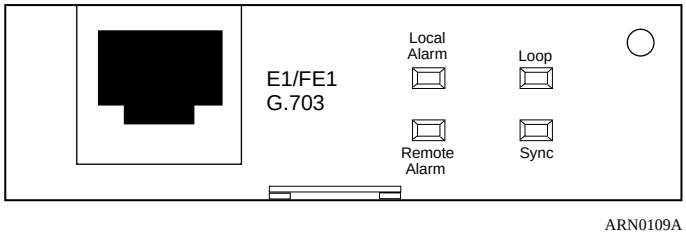


Figure 2-2. E1/FE1 WAN Adapter Module LEDs

Table 2-3 describes the function of each E1/FE1 LED.

Table 2-3. E1/FE1 WAN Adapter Module LEDs

Label	Color	Meaning
Local Alarm	Amber	Lights when the E1 port is in a local alarm state.
Remote Alarm	Amber	Lights when the E1 port has received a remote alarm from the E1 network.
Loop	Amber	Lights when the E1 interface is placed in loopback mode.
Sync	Green	Lights when the E1 port is synchronized with the E1 network.

Completing Software Configuration

Once you have successfully installed the adatper module, complete the following software configuration tasks using instructions found in your BayRS documentation.

Configuration Task	Location of Instructions
Connect the ARN to the network.	One of the following: • *Installing and Operating BayStack ARN Routers* • *Configuring BayStack Remote Access*
Modify the ARN configuration file to add the E1/FE1 module and enable default E1/FE1 software services.	One of the following: • *Configuring and Managing Routers with Site Manager* • *Using the Bay Command Console (BCC)*
Configure E1/FE1 services.	One of the following: • *Configuring WAN Line Services* • *Configuring BayStack Remote Access*

For the latest information, be sure to review the release notes and documentation change notice for your version of BayRS software..

Note: The only boot/startup methods you can use from the E1/FE1 WAN adapter module interface are Local Boot and EZ-Install. The E1/FE1 WAN adapter module does not support Netboot or Directed Netboot.

Note: Adding software for the WAN adapter module may increase the router's memory requirements beyond its current capacity. If the BayStack router experiences a memory problem, see the section "Memory or Buffer Problem" in *Troubleshooting Routers*. For information about changing the router image, see *Configuring and Managing Routers with Site Manager.*

Chapter 3
Using the E1/FE1 WAN Adapter Module in a Passport 5430 Multiservice Access Switch

This chapter supplements *Installing and Operating the Passport 5430 Multiservice Access Switch*. Follow the hardware installation steps in that manual, then refer to this document for information specific to the E1/FE1 WAN adapter module.

Warning: The E1/FE1 WAN adapter module is designed to operate only in AN, ANH, and ARN BayStack routers, and the Passport 5430 and Passport 2430. Attempting to use the E1/FE1 WAN adapter module in any other product may be hazardous and invalidates the regulatory approval.

WAN Adapter Module Placement Considerations

When installing WAN adapter modules in the Passport 5430 Module slots, note the following:

- Each WAN adapter module you install is automatically assigned a circuit, even if the WAN adapter module has not been configured. This prevents disruption of active circuits if you reconfigure the module at a later time.
- ISDN BRI adapter modules can use two circuits (one for each of the 2 B channels).
- You can configure a total of 4 circuits.
- Circuit allocations are prioritized according to which Module slot is being used by the WAN adapter modules. Module slot 3 has priority over Module slot 4, and Module slot 4 has priority over Module slot 5.

- When there are more than the 4 possible circuits to be configured, for example if there are 2 ISDN BRI adapter modules and a serial adapter module (5 circuits in all), circuit allocation becomes an issue.

In the example above, the first ISDN BRI module (in Module slot 3) has the resources to bring up a second B channel (thus using 2 circuits). The serial adapter in Module slot 4 uses a third circuit. The second ISDN BRI adapter module (in Module slot 5), can have only 1 B channel configured because the serial adapter module (in Module slot 4) has priority and is allocated a circuit over anything in Module slot 5. In this case, there are not enough circuits left to utilize the second B channel on the ISDN BRI adapter in Module slot 5. In this example, if you wanted to have both B channels on both ISDN BRI adapters configured, you would have to remove the serial card from Module slot 4.

Table 3-1 lists examples of valid WAN adapter module combinations.

Table 3-1. Example WAN Adapter Module Combinations

Module 3	Module 4	Module 5
T1/FT1 or E1/FE1	T1/FT1 or E1/FE1	T1/FT1 or E1/FE1
T1/FT1 or E1/FE1	T1/FT1 or E1/FE1	Serial or V.34 modem
T1/FT1 or E1/FE1	Serial or V.34 modem	Serial or V.34 modem
T1/FT1 or E1/FE1	T1/FT1 or E1/FE1	ISDN 2 B-channels plus 1 D-channel
T1/FT1 or E1/FE1	ISDN BRI 1 B-channel plus 1 D-channel	Serial or V.34 modem
T1/FT1 or E1/FE1	Serial or V.34 modem	Serial or V.34 modem
Serial or V.34 modem	Serial or V.34 modem	Serial or V.34 modem
Serial or V.34 modem	Serial or V.34 modem	ISDN BRI 1 B-channel plus 1 D-channel
Serial or V.34 modem	Serial or V.34 modem	ISDN BRI 2 B-channels plus 1 D-channel
Serial or V.34 modem	ISDN BRI 2 B-channels plus 1 D-channel	ISDN BRI 1 B-channel plus 1 D-channel
ISDN BRI 2 B-channels plus 1 D-channel	ISDN BRI 2 B-channels plus 1 D-channel	Empty
ISDN BRI 2 B-channels plus 1 D-channel	ISDN BRI 1 B-channel plus 1 D-channel	Serial or V.34 modem
ISDN BRI 2 B-channels plus 1 D-channel	ISDN BRI 1 B-channel plus 1 D-channel	T1/FT1 or E1/FE1
ISDN BRI 2 B-channels plus 1 D-channel	Serial or V.34 modem	ISDN BRI 1 B-channel plus 1 D-channel
ISDN BRI 2 B-channels plus 1 D-channel	T1/FT1 or E1/FE1	ISDN BRI 1 B-channel plus 1 D-channel

Attaching Cables

Connect the communications cable to the RJ-48C connector on the installed adapter module.

You install the E1/FE1 adapter module in one of the three front-panel Module slots (Figure 3-1). See *Installing and Operating the Passport 5430 Multiservice Access Switch* for the complete installation procedure.

Note: The slot labeled Remote Console is reserved for the V.34 modem adapter module. Do not install the E1/FE1 adapter module in the Remote Console slot.

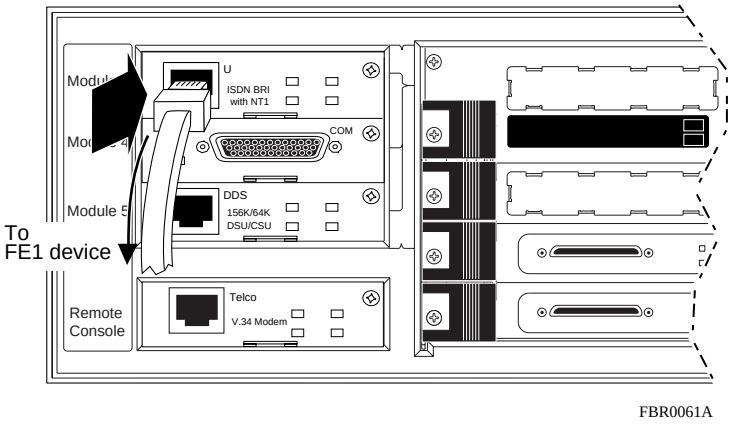


Figure 3-1. E1/FE1 WAN Adapter Module Connector on a Passport 5430

Connect the E1/FE1 cable to the connector on the installed adapter module (Figure 3-1).

Note: The E1/FE1 input port shall operate with an interconnecting cable loss within the range of 0 to 6 decibels (dB), measured at 1024 kilohertz (kHz).

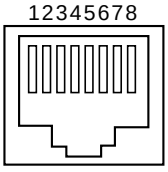
E1/FE1 Connections

The Passport 5430 supports the conversion of data (HDLC protocol) from an E1 line using an optional E1/FE1 adapter module. The integrated DSU/CSU functionality allows direct connection to the E1 network, as opposed to connecting via an external adapter. This solution reduces equipment costs and simplifies connection to an E1 carrier.

The E1/FE1 implementation supports dynamic reconfiguration, Fractional E1 loopback, and an integrated Bit Error Rate Test (BERT) line tester. *Configuring WAN Line Services* describes these services and how to configure them for connection to a E1 network.

Table 3-2 lists the E1/FE1 connector pinouts.

Table 3-2. RJ-48C Connector Pinouts

Pin Assignment	Pin No.	Signal
	1	Receive Data TIP
	2	Receive Data RING
	3	Chassis Ground
	4	Send Data TIP
	5	Send Data RING
	6	Chassis Ground
	7	No Connect
	8	No Connect

Interpreting LEDs

The E1/FE1 WAN adapter module has four LEDs (Figure 3-2).

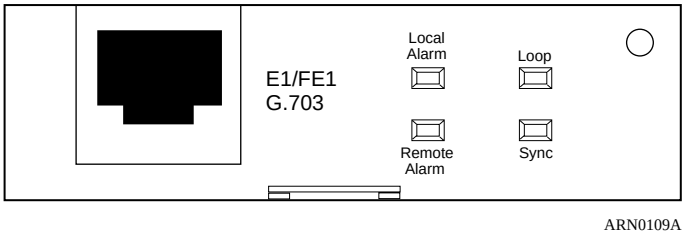


Figure 3-2. E1/FE1 WAN Adapter Module LEDs

Table 3-3 describes the function of each E1/FE1 LED.

Table 3-3. E1/FE1 WAN Adapter Module LEDs

Label	Color	Meaning
Local Alarm	Amber	Lights when the E1 port is in a local alarm state.
Remote Alarm	Amber	Lights when the E1 port has received a remote alarm from the E1 network.
Loop	Amber	Lights when the E1 interface is placed in loopback mode.
Sync	Green	Lights when the E1 port is synchronized with the E1 network.

Completing Software Configuration

Once you have successfully installed the adatper module, complete the following software configuration tasks using instructions found in your BayRS documentation:

Configuration Task	Location of Instructions
Modify the Passport 5430 configuration file to add the E1/FE1 module and enable default E1/FE1 software services.	• *Configuring and Managing Routers with Site Manager* • *Using the Bay Command Console (BCC)*
Configure E1/FE1 services.	• *Configuring WAN Line Services* • *Configuring BayStack Remote Access*

For the latest information, be sure to review the release notes and documentation change notice for your version of BayRS software.

Note: The only boot/startup methods you can use from the E1/FE1 WAN adapter module interface are Local Boot and EZ-Install. The E1/FE1 WAN adapter module does not support Netboot or Directed Netboot.

Chapter 4
Using the E1/FE1 WAN Adapter Module in a Passport 2430 Multiservice Access Switch

This chapter supplements *Installing and Operating the Passport 2430 Multiservice Access Switch.* Follow the hardware installation steps in that manual, then refer to this document for information specific to the E1/FE1 WAN adapter module.

Warning: The E1/FE1 WAN adapter module is designed to operate only in AN, ANH, and ARN BayStack routers and the Passport 5430 and Passport 2430. Attempting to use the E1/FE1 WAN adapter module in any other product may be hazardous and invalidates the regulatory approval.

Attaching Cables

Connect the communications cable to the RJ-48C connector on the installed adapter module.

You install the E1/FE1 adapter module in one of the two rear-panel WAN adapter module slots (Figure 4-1). See *Installing and Operating the Passport 2430 Multiservice Access Switch* for the complete installation procedure.

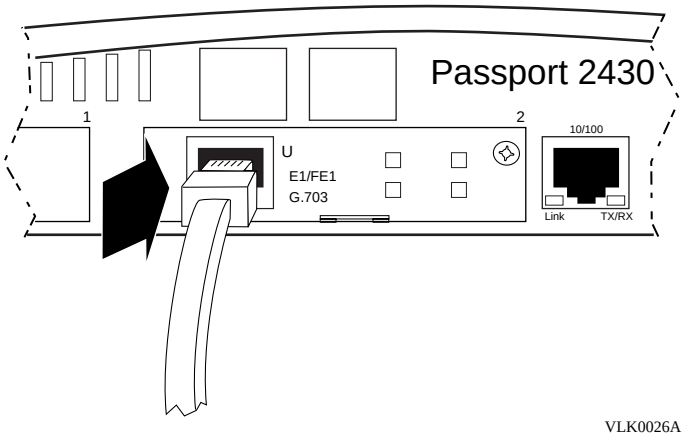


Figure 4-1. E1/FE1 WAN Adapter Module Connector on a Passport 2430

Connect the E1/FE1 cable to the connector on the installed E1/FE1 adapter module (Figure 4-1).

Note: The E1/FE1 input port shall operate with an interconnecting cable loss within the range of 0 to 6 decibels (dB), measured at 1024 kilohertz (kHz).

E1/FE1 Connections

The Passport 2430 supports the conversion of data (HDLC protocol) from an E1 line using an optional E1/FE1 adapter module. The integrated DSU/CSU functionality allows direct connection to the E1 network, as opposed to connecting via an external adapter. This solution reduces equipment costs and simplifies connection to an E1 carrier.

The E1/FE1 implementation supports dynamic reconfiguration, Fractional E1 loopback, and an integrated Bit Error Rate Test (BERT) line tester. *Configuring WAN Line Services* describes these services and how to configure them for connection to an E1 network.

Table 4-1 lists the E1/FE1 connector pinouts.

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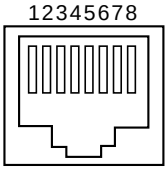	1	Receive Data TIP
	2	Receive Data RING
	3	Chassis Ground
	4	Send Data TIP
	5	Send Data RING
	6	Chassis Ground
	7	No Connect
	8	No Connect

Interpreting LEDs

The E1/FE1 WAN adapter module has four LEDs (Figure 4-2). Table 4-2 describes the function of each E1/FE1 LED.

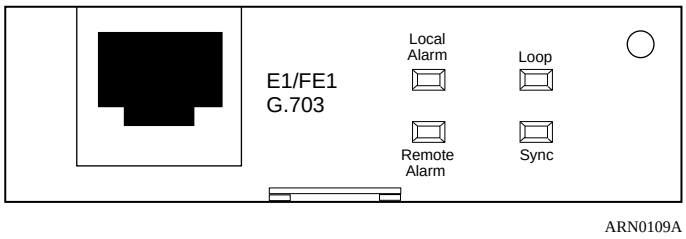

Figure 4-2. E1/FE1 WAN Adapter Module LEDs

Table 4-2. E1/FE1 WAN Adapter Module LEDs

Label	Color	Meaning
Local Alarm	Amber	Lights when the E1 port is in a local alarm state.
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Loop	Amber	Lights when the E1 interface is placed in loopback mode.
Sync	Green	Lights when the E1 port is synchronized with the E1 network.

Completing Software Configuration

Once you have successfully installed the adatper module, complete the following software configuration tasks using instructions found in your BayRS documentation:

Configuration Task	Location of Instructions
Connect the Passport 2430 to the network.	One of the following: • *Installing and Operating the Passport 2430 Multiservice Access Switch* • *Configuring BayStack Remote Access*
Modify the configuration file to add the E1/FE1 module and enable default E1/FE1 software services.	One of the following: • *Configuring and Managing Routers with Site Manager* • *Using the Bay Command Console (BCC)*
Configure E1/FE1 services.	One of the following: • *Configuring WAN Line Services* • *Configuring BayStack Remote Access*

For the latest information, be sure to review the release notes and documentation change notice for your version of BayRS software.

Note: The only boot/startup methods you can use from the E1/FE1 WAN adapter module interface are Local Boot and EZ-Install. The E1/FE1 WAN adapter module does not support Netboot or Directed Netboot.